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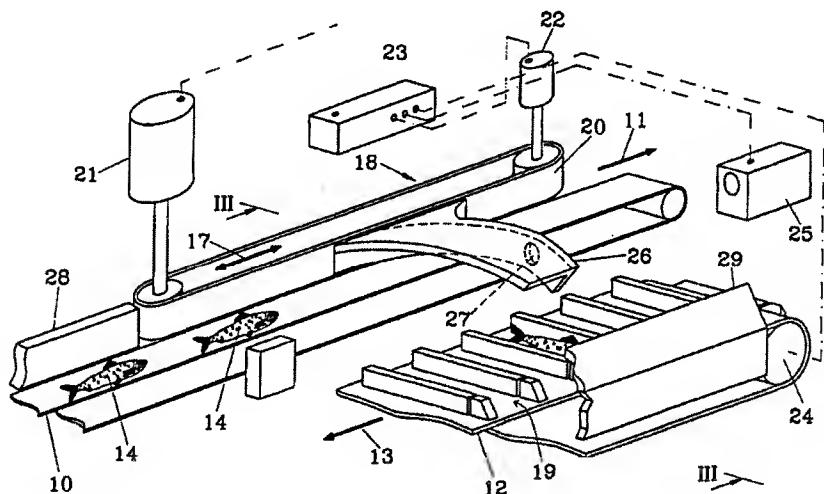
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(54) Title: APPARATUS FOR TRANSFERRING OBJECTS FROM A FIRST TO A SECOND CONVEYOR



(57) Abstract

An apparatus and a method for transferring an irregular stream of objects from a first conveyor (10) to a second conveyor (12) in such a way that the objects form a regular stream of objects on the second conveyor (12). The first conveyor (10) operates with a higher conveying speed than the second conveyor (12) and for some distance in parallel with the second conveyor. A deflection means (15; 18; 32) for movable deflection of objects (14) between the two conveyors (10, 12) is provided with means (21-25; 34) for synchronization with the movement of the second conveyor (12). The objects (14) being conveyed upon the first conveyor (10) are deflected from this conveyor over to the second conveyor (12) at various points along the above mentioned distance, depending upon how closely the objects are transported upon the first conveyor (10).

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TITLE

5 Apparatus for transferring objects from a first to a second conveyor

FIELD OF THE INVENTION

The present invention refers on one hand to a apparatus for transferring an irregular stream of objects from a first 10 conveyor to a second conveyor in such a way that the objects form a regular stream of objects on the second conveyor, wherein the first conveyor operates with a higher conveying speed than the second conveyor and for some distance in parallel with said second conveyor, and on the other to a 15 method for accomplishing said transferring.

BACKGROUND OF THE INVENTION

20 The state of the art comprises many examples of machines which operate according to the principle that an irregular flow of objects, e.g. fishes, are to be synchronised to the pace of a conveyor.

25 Industrial handling of easily damaged objects may however be difficult to automatize. One example of such an activity is the handling of small types of fish, e.g. herring within the canning factories. Because this type of fish has a very thin and fragile skin, it is not possible to use down-scaled versions of machines for handling larger types of fish.

30 One reason for this is that these machines use means for synchronization the conveying of the fish to equipment for singular processing of each fish. For example, such a machine may be adapted for loading fish one by one in trays on a conveyor which conveys the fish in the trays along 35 means for decapitating fish heads and for removal of intestines. The means for synchronization the conveying of the fish to said trays may comprise rotating brushes, barbed

wheels, or means for driving the fish by pinching it. These means are thus used for retarding and accelerating single fish and if the fish comprises small fish, this handling often lead to quality-reducing damages on the fish. A 5 contributing reason for this, is that is that small fish, e.g. small herring, varies considerably in size and they are therefore difficult to handle mechanically.

THE TECHNICAL PROBLEM

10 One purpose of the present invention is therefore to provide an apparatus according to the above which fulfils demands for high capacity and for careful handling of the objects.

THE SOLUTION

15 For this purpose, the apparatus according to the invention is characterized in deflection means for movable deflection of objects between the two conveyors, which deflection means is provided with means for synchronization with the movement of the second conveyor. The method according to the 20 invention is characterized in that the objects are transported at a higher speed on the first conveyor than on the second conveyor, that the objects during transfer from the first conveyor is deflected from said conveyor over to the second conveyor, and that deflection of objects from the first to the second conveyor occurs at various points along 25 said distance, depending upon how closely the objects are transported upon the first conveyor.

DESCRIPTION OF THE DRAWINGS

30 The invention will be described hereinafter with reference to embodiments shown in the enclosed drawings, wherein Fig. 1 shows a first, schematically depicted variant of the apparatus according to the invention in a horizontal projection, 35 Fig. 2 shows in more detail in a perspective view a second variant of the invention,

Fig. 3 is a section along the line III-III in Fig. 2, and

Fig. 4 shows a section of still another variant of the invention in a side view.

5

DESCRIPTION OF EMBODIMENTS

The following embodiments are adapted for handling fish, but other areas of application are naturally possible, e.g. handling of fruit or vegetables.

10

The apparatus schematically shown in Fig. 1, comprises a first endless conveyor 10, which operates in the direction of the arrow 11, and a second endless conveyor 12, which operates in parallel with said first conveyor, but in the direction of the arrow 13.

The first conveyor 10 operates with a higher conveying speed than the second conveyor 12, which means that the fish 14 moves with a higher speed on the conveyor 10 than on the conveyor 12. Also, they move in an irregular flow, so that several fishes may be conveyed in close file, or be conveyed more spread out. A deflector means 15 is provided with a U-shaped deflector shunt 16 and it is movable as illustrated by the arrow 17, between the two conveyors 10, 12. When a fish 14 moves towards the shunt 16 on the conveyor 10, it will be deflected 180° over to the conveyor 12 operating in the opposite direction.

The deflector means 15 is synchronized with the second conveyor 12, so that it either may move downstream said conveyor 12, or it may move one step at a time in the direction upstream said conveyor. A not shown detecting means is arranged at the shunt 16, for detection of the passage of a fish 14 through the deflector shunt 16. The detection means may operate mechanically or electrically and brings about that the deflector means 15 moves itself one step upstream the second conveyor 12. When the next fish

passes the detection means, a new step-by-step movement of the deflector means 15 in the same direction. In the moment between and after these two step-by-step movements downstream the deflector means 15 moves itself downstream 5 the conveyor 12 until the next fish is detected by the detection means.

The length of this step-by-step movement is adapted to the length of the objects 14, so that the objects are placed 10 with regular distances upon the conveyor 12. If desired, the loading of objects upon the conveyor 12 follows a given pattern, so that regular groups with a certain number of objects are arranged in sequence upon the conveyor 12.

15 The above described apparatus may thus transfer an irregular stream of objects from a first conveyor to a second conveyor, in such a way that the objects form a regular stream of objects on the second conveyor. The transferring is synchronized with the operation of the second conveyor 20 12, but in such a way that it is the objects on the first conveyor 10 which controls deflection by the deflection means to the second conveyor 12.

25 The conveyor 10 in the above described embodiment may for example comprise a gravity chute which slopes in the direction of the arrow 11. The deflector means 15 may be synchronized to the conveyor 12 via a hook means which is in engagement with this conveyor and is disengaged when a fish passes through the deflector shunt 16, wherein the deflector 30 means is moved one step upstream the conveyor 12. The deflector shunt 16 may also be L-shaped instead of U-shaped, in order to orientate the fish across the longitudinal direction of the conveyor 12. For this object, the conveyor 12 may be provided with trays with vertical walls 35 cooperating with a flap at the deflector means. When a fish passes the flap, the flap is lifted out of engagement with

the tray, whereafter the flap may engage the next following tray.

Fig. 2 and 3 shows a second embodiment of the invention, wherein the objects 14, fish, are orientated via the deflector means 18, so that the fish are placed side by side in trays 19 on the conveyor 12 which moves in the direction of the arrow 13. The capacity of the conveyor 12 may for example be about 400 fishes per minute.

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The fish 14 is conveyed forward in the direction of the arrow 11, with irregular distances upon the endless conveyor 10, orientated in the same direction with reference to the head and the dorsal fin. The conveying speed of the conveyor 10 may for example be about 5 meters per second.

15

The deflection means 18 comprises an endless tooth belt 20, which is driven in optional direction by means of two in separate directions operating stepping motors 21, 22. These motors 21, 22 are electrically connected to a micro processor 23, which also is connected to a detector 24 for registration of the conveying of the trays 19 and their exact position at the conveyor 12, and to an optical detector 25 for detecting the passage of a fish through a curved deflector shunt 26, which is mounted on the tooth belt 20 and is provided with an opening 27 for the light beam of the optical detector 25.

20

The micro processor 23 is also electrically connected to a pivoting valve flap 28 which when detecting that the deflector shunt 26 is at the downstream end of its control range, is pivoted in over the conveyor 10 and brings a number of fishes to be diverted from the conveyor 10, for recirculation in accordance with prior art.

25

When the fish 14 is conveyed by the conveyor 10, they have been accelerated by it up from a somewhat lower conveying

speed. This results in that the fishes are conveyed towards the deflector shunt 26 with a certain irregular reciprocal distance. The deflector shunt 26 is so designed that a fish substantially maintains its inertia while being turned 90°
5 by the conveyor 10 down into the tray 19 on the conveyor 12. A stop means 29 defines the position of the fish in the tray 19. A brake means 30, e.g. in the form of a ductile rubber disc absorbs a large part of the inertia of the fish in the moment before the head of the fish reaches the stop means
10 29. The rubber reed 30 is mounted at a stand frame 31 which also carries the conveyors 10, 12 and the deflector means 18.

Because the inertia of the fish is substantially maintained
15 until it rests inside the tray 19, the dynamic forces which occur when the fish passes through the deflector shunt 26 and down into the tray 19, are used for securing the orientation of the fish. When the fish glides through the deflector shunt 26, the fish is pressed towards its deflector surfaces while simultaneously being bent in the longitudinal direction, wherein it is being prevented from being rotated around its longitudinal axis. When the fish
20 then slides down into the tray 19, further alterations in the direction of movement of the fish takes place, first downwards and then back to being in parallel with the upper side of the conveyor 12. These changes in direction generates forces which influences the fish and which result in that fishes of size down to a few in multiples of ten gramme may be handled as stable with reference to their
25 orientation as fishes that are considerably more heavy.
30

Fig. 4 shows still another variant of the invention, where a first conveyor is designed as an inclined plane, which is formed by a series of flaps 32 being pivotally connected via pegs 33 to a chain 34. The chain 34 forms in conjunction with the bottom wall 35 a second conveyor which deliver one fish at a time at an end edge 36 to a following tray
35

conveyor 37. The flaps 32 normally strive to occupy a neutral position in parallel with the inclined plane. An irregular flow of fish glides downwards along this plane with their head first. When such a fish reaches a pivoted flap, this fish will be guided downwards with the head against the in Fig. 4 shown left half of the preceding flap. Then this flap will pivot around its peg 33, so that the fish may slide down with the head against the bottom wall 35. The next following fish is guided in the same way down towards the bottom wall 35 by the recently pivoted flap. Consequently, the irregular stream of fish will be transferred into an irregular stream also by this embodiment of the invention.

The invention is not limited to the above described embodiment, instead more variants are conceivable within the scoop of the following claims. For example, the conveyor 12 and the deflector means 15, 18 may be designed in many different ways than shown. The expression "conveyor" may comprise an endless belt conveyor with or without trays for fish or other objects, but the expression also comprises other types of conveyors such as chutes etc., which may use gravitation, air jets or water jets as propelling force.

CLAIMS

1. Apparatus for transferring an irregular stream of objects from a first conveyor (10) to a second conveyor (12) in such a way that the objects form a regular stream of objects on the second conveyor (12), wherein the first conveyor (10) operates with a higher conveying speed than the second conveyor (12) and for some distance in parallel with said second conveyor,
5 characterized in deflection means (15; 18; 32) for movable deflection of objects (14) between the two conveyors (10, 12), which deflection means (18) is provided with means (21-25; 34) for synchronization with the movement
10 of the second conveyor (12).

15
2. An apparatus in accordance with claim 1,
characterized in that the deflection means (15) is movable along the two conveyors (10, 12) and is synchronized via mechanical means to the second conveyor (12).
20
25
3. An apparatus in accordance with claim 1,
characterized in that the deflection means (18) is movable along the two conveyors (10, 12) and is synchronized via electronic means (21-25) to the second conveyor (12), which means comprise detector means (21, 22, 24) for detecting the position of the deflector means with reference to the second conveyor (12) and means (25) for detecting the passage of an object through the deflector means (18).
30
35
4. An apparatus in accordance with claim 1,
characterized in that the first conveyor (10) is located at a higher level than the second conveyor (12).

5. An apparatus in accordance with claim 4,
characterized in that the deflector means (18)
is curved from the upper side of the first conveyor (10) in
the direction down to the upper side of the second conveyor
15 (12).

6. An apparatus in accordance with claim 5,
characterized in that damper means (30) for
damping the inertia of the objects is arranged at the other
10 conveyor (12).

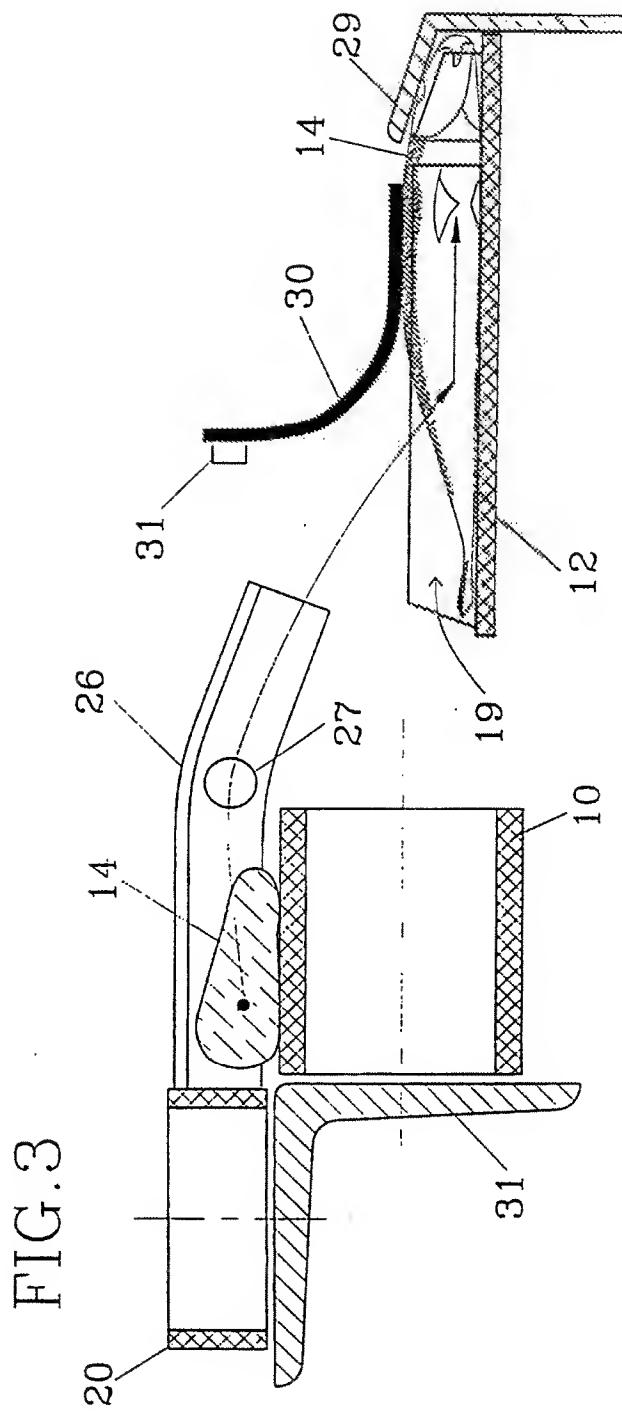
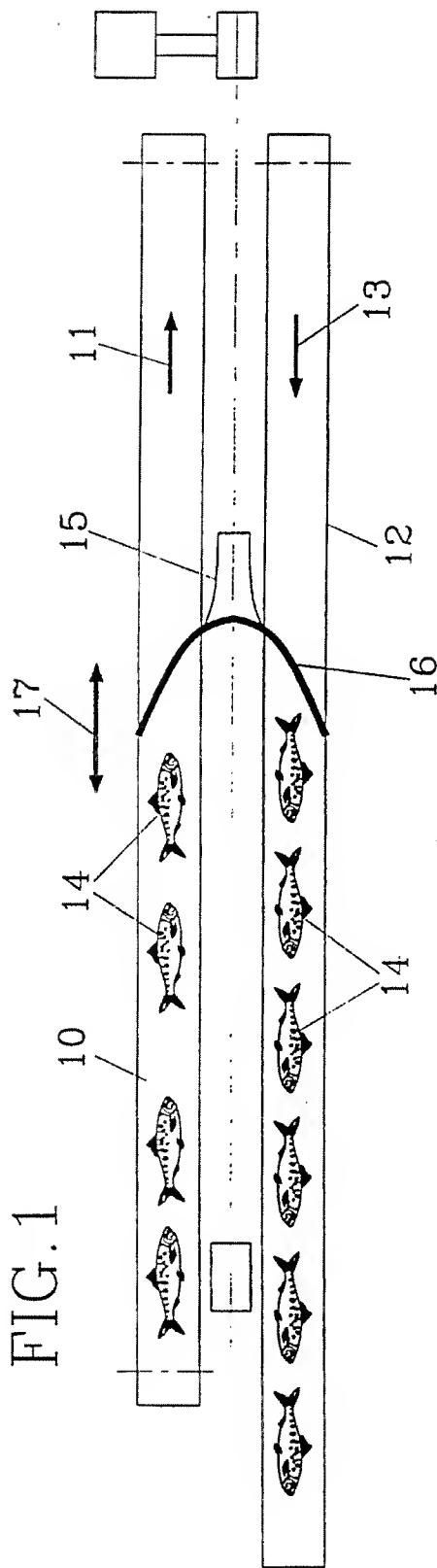
7. A method for transferring an irregular stream of
objects (14) transported on a first conveyor (10), over to
a second conveyor (12) in such a way that the objects form
15 a regular stream of objects on the second conveyor (12),
wherein the two conveyors operate in parallel for some
distance, characterized in that the objects
(14) are transported at a higher speed on the first conveyor
(10) than on the second conveyor (12),
20 that the objects (14) being conveyed upon the first conveyor
(10) are deflected from said conveyor over to the second
conveyor (12), and
that deflection of objects from the first to the second
conveyor occurs at various points along said distance,
25 depending upon how closely the objects are transported upon
the first conveyor (10).

8. A method in accordance with claim 7,
characterized in that the movement of the point
30 of deflection is in direction upstream the direction of
travel of the second conveyor, as soon as an object (14) is
deflected from the first to the second conveyor (10; 12).

9. A method in accordance with claim 8,
35 characterized in that the point of deflection
then follows the second conveyor (12) until the next object
is deflected.

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10. A method in accordance with claim 7,
characterized in that the two conveyors (10,
12) travel in parallel at opposite directions.



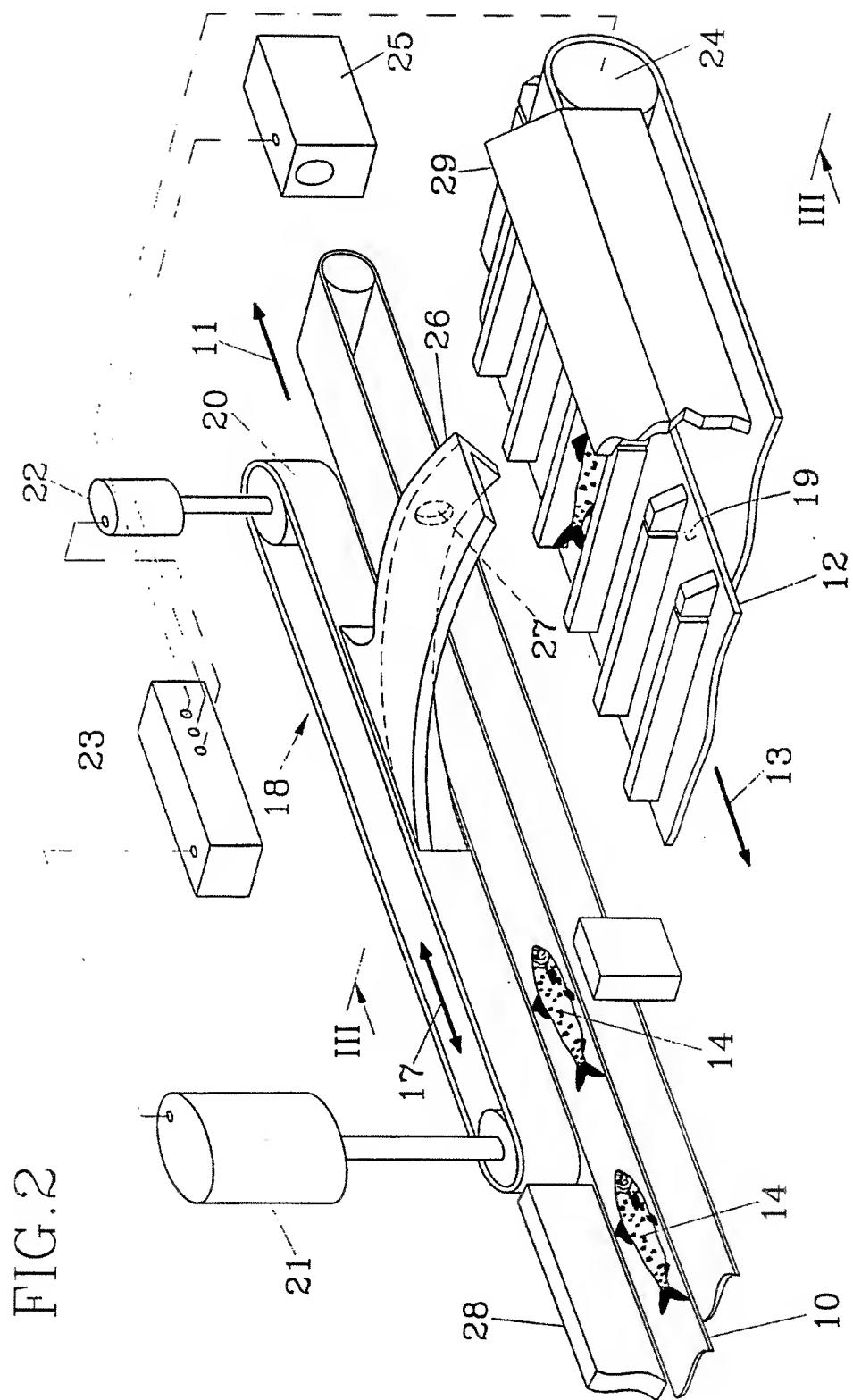
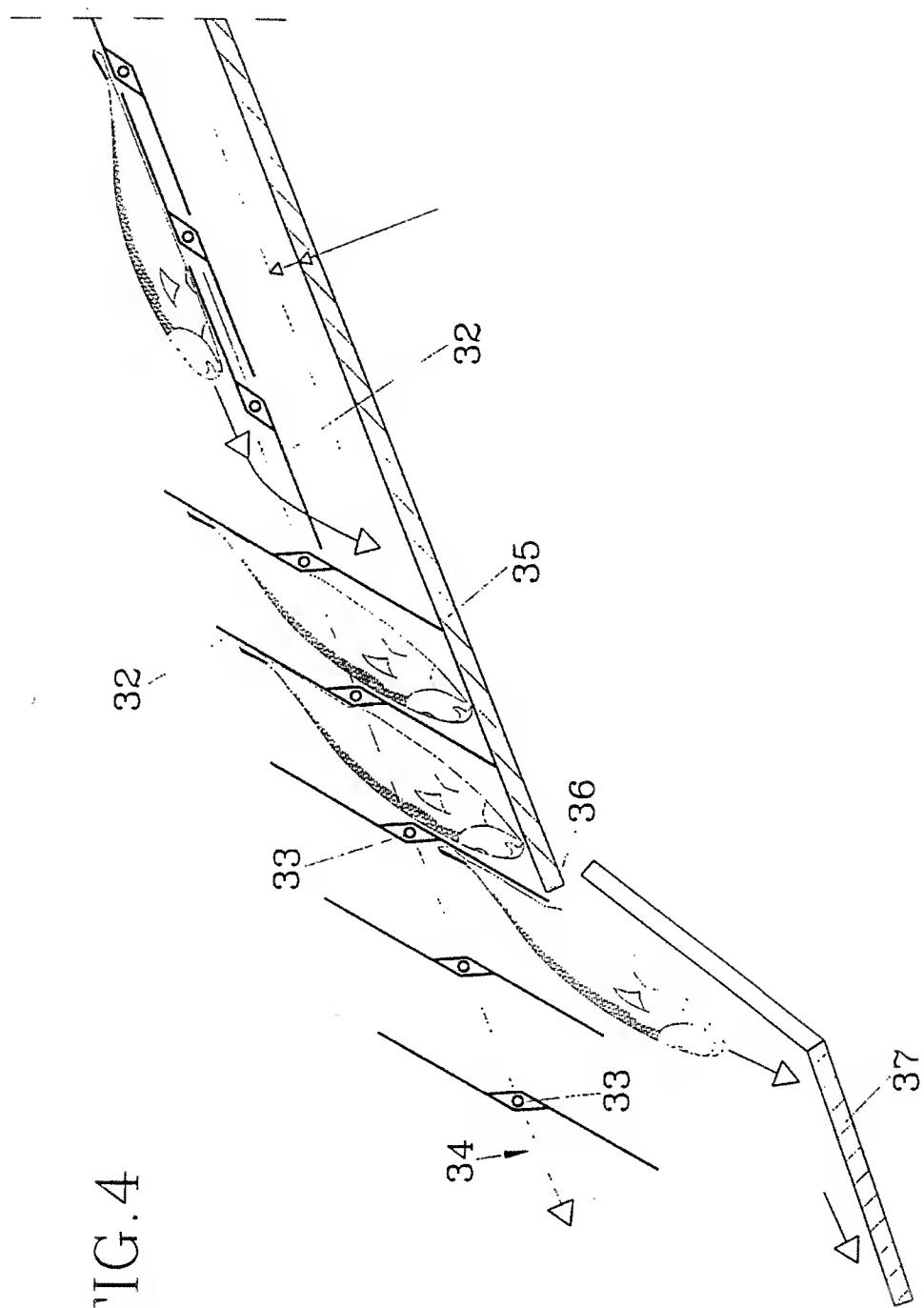


FIG. 2

FIG. 4



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 96/01032

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65G 47/31, A22C 25/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B65G, A22C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NL 9202146 A (MARELEC BVBA), 1 July 1993 (01.07.93) --	1,7
A	US 4469219 A (COSSE), 4 Sept 1984 (04.09.84) -- -----	1,7

 Further documents are listed in the continuation of Box C. See patent family annex.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

01/10/96

International application No.
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Patent document cited in search report	Publication date		Patent family member(s)		Publication date
NL-A- 9202146	01/07/93		BE-A- 1005540		28/09/93
US-A- 4469219	04/09/84		CA-A- 1188714		11/06/85
			EP-A,B- 0057386		11/08/82
			FR-A,B- 2499033		06/08/82